

AMENDMENTS TO THE CLAIMS

1. **(Original)** A method of identifying a set of biologically-active DNA-binding sites for a protein of interest in the genome of a cell, the method comprising
 - (i) identifying a set of regions of genomic DNA to which the protein of interest is bound in the cell;
 - (ii) identifying candidate DNA-binding sites in the identified regions of genomic DNA, wherein a candidate DNA-binding site comprises a sequence corresponding to a DNA-sequence motif for the protein of interest;
 - (iii) determining if the candidate DNA-binding sites are conserved in an equivalent genomic region in one or more species different from the species from which the cell is obtained, wherein a candidate DNA-binding site that is conserved in at least one of the different species is a biologically-active DNA-binding site.
2. **(Original)** The method of claim 1, wherein step (i) further comprises identifying a DNA-sequence motif for the protein from the set of regions of genomic DNA.
3. **(Original)** The method of claim 2, wherein the DNA-sequence motif is enriched by a statistically-significant amount in the set of regions of genomic DNA relative to a suitable control.
- 4-6. **(Canceled)**
7. **(Original)** The method of claim 3, wherein the suitable control comprises a set of genomic regions which are bound by a mutant form of the protein of interest in the cell.
8. **(Original)** The method of claim 1, wherein the regions of genomic DNA comprise promoter regions.

9-11. **(Canceled)**

12. **(Original)** The method of claim 2, wherein a candidate DNA-binding site is conserved if the equivalent genomic region in at least one different species comprises a nucleic acid sequence that matches the DNA-sequence motif for the protein of interest.

13-15. **(Canceled)**

16. **(Original)** The method of claim 1, wherein the candidate DNA-binding site is less than 20 bp in length.

17. **(Original)** The method of claim 1, wherein the DNA-sequence motif is degenerate in at least one position.

18. **(Canceled)**

19. **(Original)** The method of claim 1, wherein step (iii) comprises determining if the candidate DNA-binding sites are conserved in equivalent genomic regions in two or more different species

20-23. **(Canceled)**

24. **(Original)** The method of claim 1, wherein the set of biologically-active DNA-binding sites comprises one or more biologically-active DNA-binding sites.

25. **(Canceled)**

26. **(Original)** The method of claim 1, wherein two regions of genomic DNA are equivalent if they both comprise a sequence of at least one orthologous gene.

27. **(Canceled)**

28. **(Original)** The method of claim 1, wherein the cell is an eukaryotic cell.

29-35. **(Canceled)**

36. **(Original)** A method of identifying an agent which alters the set of biologically-active DNA-binding sites for a protein of interest in the genome of a cell, the method comprising

- (i) contacting an experimental cell with a candidate agent;
- (ii) identifying a set of biologically-active DNA-binding sites for a protein of interest in the genome of the cell of step (i) according to the method of claim 2, thereby generating an experimental set of biologically-active DNA-binding sites;
- (iii) comparing
 - (1) the experimental set of biologically-active DNA-binding sites to
 - (2) a control set of biologically-active DNA-binding sites for the protein of interest;wherein a candidate agent is identified if the experimental set and the control set differ.

37. **(Canceled)**

38. **(Original)** A method of identifying a pathway that is transcriptionally regulated by a protein of interest in a cell, the method comprising

- (i) identifying a set of biologically-active DNA-binding sites for a protein of interest in the genome of the cell according to the method of claim 2; and
- (ii) identifying at least two candidate genes likely to be regulated by binding of the protein of interest to the set of biologically-active DNA-binding sites identified in (i); wherein a pathway that is transcriptionally regulated by the protein of interest is identified if at least two candidate genes are members of the same pathway.

39. **(Canceled)**

40. **(Canceled)**

41. The method of claim 38, wherein the pathway is a gene expression pathway.

42-44. **(Canceled)**

45. **(Currently Amended)** A method of identifying two sets of conditions in which a protein of interest differentially binds to the genome of a cell, the method comprising:

(i) identifying, according to the method of claim 1,

(1) a first set of biologically-active DNA-binding sites for the protein of interest in the genome of a cell according to the method of claim 1, wherein the cell is exposed to a first set of conditions; and

(2) (ii) identifying a second set of biologically-active DNA-binding sites for the protein of interest in the genome of a cell according to the method of claim 1, wherein the cell is exposed to a second set of conditions; and

(iii) comparing the first set of biologically-active DNA-binding sites to the second set of biologically-active DNA-binding sites and determining if the two sets differ.

46. **(Currently Amended)** A method of identifying a property of a gene product of a gene of interest that correlates with the binding activity of a polypeptide encoded by the gene of interest to the genome of a cell, the method comprising

(i) identifying two sets of conditions in which a protein of interest differentially binds to the genome of the cell according to the method of claim [[44]] 45;

(ii) determining a property of a gene product of the gene of interest in (a) a cell exposed to the first set of conditions; and in (b) a cell exposed to the second set of conditions; and

(iii) determining if at least one property of the gene product differs in the two cells of step (ii),
thereby identifying a property that correlates with the binding activity of a gene of interest to the genome of a cell.

47. **(Original)** A method of identifying a property of a gene product of a gene of interest that correlates with the binding activity of a polypeptide encoded by the gene of interest to the genome of a cell, the method comprising
(i) identifying an agent which alters the set of biologically-active DNA-binding sites for a protein of interest in the genome of a cell according to the method of claim 36;
(ii) determining a property of a gene product of the gene of interest in (a) a cell contacted with the agent; and in (b) a cell not contacted with the agent; and
(iii) determining if at least one property of the gene product differs in the two cells of step (ii),
thereby identifying a property that correlates with the binding activity of a gene of interest to the genome of a cell.

48. **(Currently amended)** The method of claim 46 or 47, wherein the property is selected from the group consisting of a protein modification, expression level, enzymatic activity and intracellular localization.

49-59. **(Canceled).**

60. **(Original)** A method of identifying two cell genotypes in which a protein of interest differentially binds to the genome of a cell, the method comprising:
(i) identifying a first set of biologically-active DNA-binding sites for the protein of interest in the genome of a cell of a first genotype;
(ii) identifying a second set of biologically-active DNA-binding sites for the protein of interest in the genome of a cell of a second genotype;

(iii) comparing the first set of biologically-active DNA-binding sites to the second set of biologically-active DNA-binding sites and determining if the two sets differ.